XV.—This low formed on the afternoon of the 29th in the Red River Valley, moved to western Minnesota and thence advanced over Lake Superior on the 30th, to the Gulf of St. Lawrence by the afternoon of the 31st. Thunderstorms and local rains occurred in the Ohio Valley, the Middle States, and New England during the passage of the storm.

LOCAL STORMS.

[By Mr. A. J. HENRY.]

The first decade of August was unmarked by local storms of unusual extent or severity.

The record for this period is confined to local showers attended by the phenomena usual in this season, thunder, lightning, strong, but not destructive winds, and sometimes hail. Deaths from lightning stroke are reported in comparatively few instances. No other loss of life is recorded except by drowning in the waters contiguous to Coney Island, where on Sunday, the 4th, during a violent thunder storm the accompanying wind imperiled excursion boats, and overturned lighter craft. Fruit trees and fruit were destroyed in this storm, and hotels were injured by lightning, but no great loss of property resulted.

No loss of human life by floods or by hurricane is reported during the month. Storms similar in character to the one mentioned above occurred on the 6th at widely separated places, the most severe being in the vicinity of Buffalo, N. Y., and in central and northern Ohio.

On the 8th, Grand Junction and Del Norte, Colo., and Tucson, Ariz., were visited by cloud-bursts. Railroads and highways were washed out, and a few residences were injured.

Similar storms occurred on the 9th at Louisiana, Mo., Junction City and Eldorado, Kans., and Minneapolis, Minn.

A letter of September 9, from Mr. W. H. Fountain, superintendent of the waterworks at Eldorado, Kans., describes the destruction of the standpipe at that place by the storm of August 9, as follows:

> All the evening the weather was quite threatening and at nightfall the clouds looked quite ominous and black. About 10 p. m. the storm broke on the city. It came almost directly from the north. For twenty minutes or more the wind blew a gale and much rain fell; then there was a lull in the storm for a few minutes, when the wind came again in a terrific gust, striking the houses in the vicinity of the standpipe almost like a wall, and it is the supposition that at this time the standpipe fell. Some of the people in the vicinity of the standpipe remember a roar at this time, which they then thought was thunder, but when they learned of the accident felt confident it was the crash of the standpipe. * * * It was noticeable that the clouds hung very low. * * * The storm was gusty and had much the appearance of being cyclonic. We have had but few, if any, storms that came stronger or more gusty than this one.

During the night of the 10th and on the succeeding day the first destructive storm of the month appeared. At Cleveland, Ohio, a power house was totally wrecked, estimated loss, $20,000; at Ashtabula, Ohio, injuries to the dock occurred, estimated loss, $10,000; and in the counties of Platte and Colfax, Nebr., 50 miles of telegraph line were blown down, and the furious rain caused large destruction of growing crops and injury to railroad embankments.

On the 11th a severe storm at Baltimore destroyed buildings including an unfinished church, and telegraph and telephone lines to the value of about $150,000. At the same time a storm raged over four counties of eastern Pennsylvania, where the losses in two boroughs are estimated at $50,000, caused in part by lightning and hail, but chiefly by wind. On that day thunderstorms also visited Penn Yan, Dansville, and Ticonderoga, N. Y.; Flemington, N. J.; Warren, Ohio; and Rennselaer, Ind. All were of considerable violence, and losses in the last-named town, caused by wind, reached about $30,000.

On the 13th standing and harvested grain in four Minnesota counties were disastrously affected by wind, rain, and hail.

On the 16th "the severest wind storm since fifteen years ago" raged at Mankalo, Miss.

Buffalo, New York, was visited on the 17th by a severe storm, in which lightning and hail did considerable damage.

On the 19th, Harvey County, Kans., suffered a loss of one-half its growing crops by hail.

On the 23d, in central Michigan, and a half dozen counties in eastern Iowa, unusually heavy showers occurred. In some places the precipitation exceeded that of any during many previous years. Copious rain fell on the same date in Arizona, south and west of Phœnix, in which a mile of railroad track was carried away. In all of these districts prolonged droughts had prevailed, and the benefit to crops was larger than the loss of property.

Boothbay Harbor, Me., was swept by a strong wind, attended by rain and thunder and lightning on the 25th. Vessels in the harbor suffered considerable damage, and by the upsetting of a yacht, 3 persons were drowned.

On the 28th, Syracuse, N. Y., and Zanesville and Cleveland, Ohio, were visited by a wind and rain storm of great violence, but no serious loss of property resulted.

On the 29th, wind destroyed a church at Waycross, Ga., and storms of wind and rain of unusual severity were reported at Galveston, Tex., Clarksville, Tenn., and several points in the interior of Tennessee.

On the 31st an inch of rain fell in twenty-five minutes in New York, and the storm's violence extended to the suburbs. Buildings were injured by the wind, and lightning struck in several places. No loss of life or large destruction of property was reported.

TEMPERATURE OF THE AIR.

[In degrees Fahrenheit.]

The mean temperature is given for each station in Table II, for voluntary observers. In Table I, for the regular stations of the Weather Bureau, both the mean temperatures and the departures from the normal are given for the current month.

The *monthly mean temperature* published in Table I, for the regular stations of the Weather Bureau, is the simple mean of all the daily maxima and minima; for voluntary stations a variety of methods of computation is necessarily allowed, as shown by the notes appended to Table II.

The *distribution* of the monthly mean temperature of the air over the United States and Canada is shown by the dotted isotherms on Chart II; the lines are drawn over the high irregular surface of the Rocky Mountain Plateau, although the temperatures have not been reduced to sea level, and the isotherms, therefore, relate to the average surface of the country occupied by our observers; such isotherms are controlled largely by the local topography, and should be drawn and studied in connection with a contour map.

The *regular diurnal period* in temperature is shown by the hourly means given in Table IV for all stations having self-registers.

The extreme mean temperatures were: Yuma, 90.9; Key West and Galveston, 83.0.

As compared with the normal for August the mean temperature for the current month was, with very few exceptions, decidedly in excess on the Atlantic Coast and westward to the one hundredth meridian. It was deficient in the lower St. Lawrence Valley and the Rocky Mountain Region. The greatest excesses were: Washington, D. C., 3.7; Milwaukee and Parkersburg, 3.5. The greatest deficits were: Los Angeles, 3.7; Medicine Hat, 3.5; and Qu'Appelle, 2.9.

Considered by districts the mean temperatures for the current month show departures from the normal as given in Table 1. The greatest positive departure was: Middle Atlantic, 2.7. The greatest negative departures were: Ohio Valley and Tennessee, 2.6; upper Mississippi, 2.4; southern Pacific Slope, 2.3.

The years of highest and lowest mean temperature are shown in Table I of the REVIEW for August, 1894. The mean temperature for August, 1895, was the highest on record at Nantucket, 68.8; Philadelphia, 77.4; Harrisburg, 75.0; Pittsburg, 74.5; Parkersburg, 76.2; Columbus, Ohio, 75.6; Green Bay, 68.4; Milwaukee, 71.6; Jacksonville, 82.9; Palestine, 82.3. It was the lowest on record at Tatoosh Island, 54.6; Neah Bay, 57.4; Eureka, 54.0; Carson City, 65.2; Fresno, 80.6.

The *maximum and minimum temperatures* of the current year are given in Table I. The highest maxima were: Yuma, 114 (5th); Fresno, 110 (5th); Red Bluff, 107 (4th); Fort Smith, 106 (21st); Walla Walla, 102 (2d); Huron, 13th, Concordia, 27th, and Abilene, 14th, 100. The lowest maxima were: Eureka, 66 (5th); Tatoosh Island, 70 (29th). The highest minimum was: Corpus Christi, 73 (2d). The lowest minima were: St. Vincent, Bismarck, and Port Crescent, 32 on the 20th, 21st, and 26th, respectively.

The *years of highest maximum and lowest minimum temperatures* are given in the last four columns of Table I of the current REVIEW. During the present month the maximum temperatures were the highest on record at: Harrisburg, 95; Parkersburg, 96; Charleston, 98; Jupiter, 93; Port Angeles, 88; Carson City, 95. The minimum temperatures were the lowest on record at: Harrisburg, 50; Bismarck, 32; Williston and Havre, 34; Neah Bay, 40; Port Angeles and Seattle, 38; Fort Canby, 48; Astoria and Eureka, 45; Carson City, 34; Fresno, 51; San Diego, 54.

The *greatest daily range of temperature and the extreme monthly range* are given for each of the regular Weather Bureau stations in Table I, which also gives data from which may be computed the extreme monthly ranges for each station. The largest values among the greatest daily ranges were: Havre, 51; Idaho Falls, 50; Baker City and Lander, 49. The smallest values were: Block Island and Hatteras, 14; Port Eads and Galveston, 15; Nantucket and Jupiter, 16; Kittyhawk, Key West, and San Diego, 17. Among the extreme monthly ranges the largest values were: Bismarck, 66; Huron, 63; Havre and Williston, 62; Carson City, 61; Pierre, 60. The smallest values were: Hatteras, 19; Corpus Christi, Port Eads, and Key West, 20.

The *accumulated monthly departures* from normal temperatures from January 1 to the end of the current month are given in the second column of the following table, and the average departures are given in the third column, for comparison with the departures of current conditions of vegetation from the normal conditions.

Districts.	Accumulated departures.		Districts.	Accumulated departures.	
	Total.	Average.		Total.	Average.
	°	°		°	°
Upper Lake	+ 0.7	+ 0.1	New England	− 2.3	− 0.3
North Dakota	+ 4.7	+ 0.6	Middle Atlantic	−10.1	− 1.3
Missouri Valley	+ 1.1	+ 0.2	South Atlantic	−16.9	− 2.1
Northern Plateau	+ 5.0	+ 0.6	Florida Peninsula	−13.0	− 1.6
			East Gulf	−18.7	− 2.3
			West Gulf	−17.7	− 2.2
			Ohio Valley and Tenn.	−13.3	− 1.7
			Lower Lake	− 5.5	− 0.7
			Upper Mississippi	− 2.1	− 0.3
			Northern Slope	− 9.9	− 1.2
			Middle Slope	− 7.8	− 1.0
			Southern Slope (Abilene)	−18.9	− 2.4
			Southern Plateau	− 9.0	− 1.1
			Middle Plateau	− 9.3	− 1.2
			North Pacific	− 0.5	− 0.0
			Middle Pacific	− 2.7	− 0.3
			South Pacific	− 6.7	− 0.8

MOISTURE.

The *quantity of moisture* in the atmosphere at any time may be expressed by means of the weight contained in a cubic foot of air, or by the tension or pressure of the vapor, or by the temperature of the dew-point. The mean dew-points for each station of the Weather Bureau, as deduced from observations made at 8 a. m. and 8 p. m., daily, are given in Table I.

The *rate of evaporation* from a special surface of water on muslin at any moment determines the temperature of the wet-bulb thermometer, but a properly constructed evaporometer may be made to give the *quantity* of water evaporated from a similar surface during any interval of time. Such an evaporometer, therefore, would sum up or integrate the effect of those influences that determine the temperature as given by the wet bulb; from this quantity the *average humidity of the air* during any given interval of time may be deduced.

The *sensible temperature* experienced by the human body and attributed to the atmosphere depends not merely upon the temperature of the air, but equally upon the dryness, the velocity of the wind, and the suddenness of atmospheric changes. The temperature of the wet-bulb thermometer as obtained by the whirling apparatus used in the shaded shelter corresponds to the temperature felt by persons standing in the shade of trees or houses, exposed to a natural breeze of at least 6 miles per hour. This temperature and its depression below the dry bulb are the fundamental data for all investigations into the relations between human physiology and the climate. In order to present a monthly summary of the atmospheric conditions from a hygienic and physiological point of view, Table VIII has been prepared, showing the maximum, minimum, and mean readings of the wet-bulb thermometer at 8 a. m. and 8 p. m., seventy-fifth meridian time.

PRECIPITATION.

[In inches and hundredths.]

The *distribution of precipitation* for the month of August, 1895, as determined by reports from about 2,500 stations, is exhibited on Chart III. The numerical details are given in Tables I, II, and III.

The precipitation for the current month was heaviest, 5 to 14 inches, on the Gulf Coast from Louisiana to Florida, and the interior of Georgia and South Carolina, but least, namely zero, on the coast and central parts of California.

The *diurnal variation* is shown by Table XII, which gives the total precipitation for each hour of seventy-fifth meridian time, as deduced from self-registering gauges kept at about 43 regular stations of the Weather Bureau; of these 37 are float gauges and 6 are weighing gauges.

The *normal precipitation* for each month is shown in the Atlas of Bulletin C, entitled "Rainfall and Snow of the United States, compiled to the end of 1891, with annual, seasonal, monthly, and other charts."

The *current departures* from the normal precipitation are given in Table I, which shows that precipitation was in excess in the St. Lawrence Valley, the east Gulf States, Georgia, and a small portion of Missouri, Kansas, Nebraska, and Iowa. Elsewhere it was generally deficient. Large excesses were: Montreal, 4.8; Wichita and Atlanta, 4.0; Omaha and Columbia, 3.8; Augusta, 3.7; Chicago, 3.5. The large deficits were: Kittyhawk, 4.5; Philadelphia, 4.2; Jacksonville, 4.1; Raleigh, 4.0; Norfolk, 3.8.

The *average departure* for each district is also given in Table I. By dividing these by the respective normals the following corresponding percentages are obtained (precipitation is in excess when the percentages of the normal exceed 100):

Above the normal: East Gulf, 122; lower Lake, 110; Missouri Valley, 117; middle Slope, 120; southern Plateau, 112.

Normal: Middle Pacific, 100.

Below the normal: New England, 91; Middle Atlantic, 55; South Atlantic, 88; Florida Peninsula, 90; west Gulf, 75; Ohio Valley and Tennessee, 58; upper Lake, 94; North Dakota, 63; upper Mississippi, 81; northern Slope, 63; Abilene